U.S. SENATOR MARIA CANTWELL
WASHINGTON

Overview of the "Reducing Demand through Electricity Grid Intelligence" Act

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Although our nation's electricity grid is vital to our economy and way of life, it uses outmoded technology which cannot record and communicate valuable information on conditions of supply, consumer loads, or system performance. This means our grid is less reliable than it could be and requires greater generation resources than it should.

Modern technology is available and being rapidly improved that could provide significant efficiency savings, reduce peak power demands, and save tens to hundreds of billions in outage costs and avoided generation investments. For example, new technologies could allow appliances to automatically avoid costly demand periods and consumers to schedule their power consumption around periods when the grid is stressed.

Senator Cantwell's Reducing Demand through Electricity Grid Intelligence Act seeks to catalyze the production, use, and integration of these promising technologies by removing barriers and creating incentives to the adoption and use of "smart grid" technology -- including smart meters, demand response equipment, distributed energy storage management systems, distribution automation systems, and smart appliances. This is accomplished through a series of financial and non-financial provisions, including tax credits, special rate structures at Federal Power Marketing Agencies, standards for system components and protocols, requiring federal agencies to reduce peak electricity demands, requiring States to adopt grid assessments and plans, and a program of federal research and development to complement the substantial private R&D in this area

In the long run a national-scale smart grid will be an enormous asset in managing both generation and load assets to reduce carbon emissions, make the most of intermittent clean power sources, and substitute electricity for imported oil in our transportation system.

Policy Principles

The key policy principles underlying the Reducing Demand through Electricity Grid Intelligence Act are:

1. *The equivalence of demand reduction with capacity addition.*

The equivalence of demand reduction with capacity addition means that measures to reduce peak electricity demand "count" precisely the same as new capacity additions. Implementing this principle means that we should invest just as aggressively in smart grid and demand response systems as we do in new capacity, and reward those that do so.

2. *A strong federal role in catalyzing rapid transformation of a critical economic sector.*

A strong federal role in catalyzing the market means that while the smart grid technology industry is growing very rapidly in terms of private investment, we need to knock down the remaining barriers, and provide focused new financial incentives in recognition that accelerated deployment of these technologies is vital to the nation's interests. Once the deployment of this technology reaches a critical point, it will become a competitive advantage in the electricity business.

3. *Providing a market environment in which clean energy can thrive.*

Providing a market in which clean energy can thrive means providing the necessary mechanisms for homes and businesses to cost-effectively generate their own clean electricity, aligning prices with real costs in the electricity sector, and empowering consumers to make informed and timely choices. An intelligent grid first provides the information needed for this type of market, and second allows incorporation of smart appliances which can make these choices based of consumer input.

Qualifying Technology and Eligibility

The Reducing Demand through Electricity Grid Intelligence Act proposes a broad and flexible definition of smart grid technology, which includes smart metering systems, demand response systems, distributed generation management systems, electrical storage management systems, distribution automation systems, and Phasor measurement systems.

This technology definition seeks to allow a broad range of technologies to qualify for favorable tax and other treatments under this bill, but sets specific thresholds for functional performance that encourages continued technological. For example, the definition of a "smart meter" is phased to include system deployed before and after 2011. The former category of smart meters must record electricity usage data at least hourly, and report on demand to both consumers and utilities on demand. Smart meters deployed in 2011 and after must record at least as frequently as every ten minutes, and must also measure voltage and power factors to qualify under this bill.

A demand response system must interpret price or other conservation request signals as frequently as one minute intervals, can act on these signals to control loads according to pre-set customer algorithms, and can report on the actions taken. This functionality allows for utilities to understand load requirements much better than they now do, and for consumers to voluntarily shut down when prices are high or a utility requests load reduction.

The remaining technology classes allow for distributed management of both electrical and thermal energy storage to reduce peak electrical loads, and systems which manage distribution systems including dynamic pricing and control of transformers and reactive power generators. Phasor Measurement systems are specifically included for applications above 100kV, and must meet IEEE standard 37.118, include GPS capability, time resolution of 2 μsec, and sample rate of 20 samples per second.

The bill also allows communication and information technology equipment dedicated to transmission or storage of information produced or used by smart grid components to qualify for financial incentives.

Eligible entities for tax credits under this bill include any taxable entity that invests in qualifying technology, including specifically utilities, retail customers, and grid service companies that provide smart grid services (but own the equipment involved) to utilities. This last provision should allow incentives for this technology in small utilities which would not otherwise adopt it, and also permits tax benefits to flow indirectly to public utilities.

Privacy Protection

Since there is potential for this technology to reveal details of consumers' electricity use down to the appliance level and time of day, there is some concern for privacy. The Reducing Demand through Electricity Grid Intelligence Act protects individual consumer data from release to third parties without written consent, while allowing aggregate data to be used to characterize system response and control parameters.

Standards

Standard-setting provisions are considered to be vital to ensure interoperability and allow for smart appliances and equipment. An "interoperability framework" will be developed through the Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability, in partnership with the National Institute of Standards and Technology (NIST) and the Federal Energy Regulatory Commission (FERC). The process set forth insures that this framework will incorporate broad industry input, and will support the abilities of different devices to exchange data, communicate, and participate in business activity regardless of the operating systems or programming languages underlying those devices. This section insures that smart grid systems and components by different manufacturers will in fact someday be able to constitute an "electranet" (Al Gore's term) – a "community" of intelligent devices on the grid.

The interoperability framework will also accommodate agreements for integrating traditional, centralized generation and transmission resources with consumer/distributed resources, including distributed generation, renewable generation, energy storage, energy efficiency, and demand response. This framework allows flexibility and incorporates regional and organizational differences and the quick pace of innovation. The framework will be agnostic to specific technologies. Each party retains freedom to choose their internal, implementation-specific information technologies and approaches as long as they support the information exchange agreement at the point where they interact.

The bill calls for DOE and FERC to develop standards for appliance interfaces, requiring certain classes of new mass- produced electric appliances and equipment be manufactured with the ability to respond to electric grid emergencies and demand response signals. The smart electrical appliance or load will curtail part or all of its electrical power consumption in response to such requests these response capabilities will increase electric grid reliability and will reduce the need for new infrastructure to meet electric load growth.

The appliance and equipment stock is continually replaced through retirement and replacement, but for each year that goes by without their being capable of responding to grid conditions, we lose an opportunity for the millions of new appliances and equipment to help provide reliable and less expensive electricity. Requiring all newly produced appliances and equipment be manufactured with simple and inexpensive interfaces which will allow future addition of demand response capabilities will rectify this lost opportunity.

These appliance interface requirements will apply to:

- residential central air conditioners and heat pumps,
- room air conditioners,
- residential furnaces and boilers,
- residential thermostats,
- commercial packaged air conditioning and heating equipment,
- space conditioning thermostats,
- residential and commercial electric water heaters
- residential refrigerators, freezers, and refrigerator/freezers
- commercial refrigeration equipment
- residential clothes dryers
- battery chargers (including those for electrically-powered vehicles).

Financial Incentives

Current tax law treats much smart metering equipment as long-lived assets requiring depreciation over 20 years. Senator Cantwell's bill remedies this by classification of smart grid technology as "qualified technological property" which has a five-year depreciation life. It also allows for cost recovery on obsolete meters prematurely retired from service when smart meters are installed.

The bill also incentivizes investment in smart grid technology by allowing for enhanced return - permitting utilities to earn up to 130% of the normally permitted (regulated) rate of return on capital.

The bill provides for 20 percent of the cost of smart grid components to be taken as federal income tax credits. This applies to any one who buys and installs the equipment - utilities, customers, and "grid service' companies which would install and own this equipment on small utility systems.

Additional tax credits ("reduction tax credits") are available in cases where smart grid components can be used to document reductions in maximum annual demand or on-peak energy use for a given class of customers. These credits are limited to 10 percent of the cost saving as valued under the applicable utility rate structure, and can continue for up to five years. This provision seeks to compensate utilities for lost revenue involved in incentivizing reductions of peak demand and on-peak energy associated with smart-grid technology.

Retail electricity agencies buying at least 30 percent of their power from Federal Power Marketing Agencies, these agencies are required to develop and promulgate special rates for systems in which 50 percent are more of energy use is "smart-metered" or controlled by demand response. These rates would reflect cost saving associated with more predictable demand and greater reliability.

Net Metering

The realization of a clean, intelligent, and distributed electricity system requires the widespread deployment of smart grid technologies and complementary net metering policies. To that end, the Reducing Demand through Electricity Grid Intelligence Act streamlines and standardizes net metering laws nationwide so that any American family or business can generate their own clean electricity. Although the majority states have passed net-metering laws in the past few years, significant barriers have inhibited the widespread adoption of net-metering practices. This legislation would prevent utilities from burdening ratepayers who choose to net meter with cost prohibitive requirements or confusing contracts and ensures that customer-generators receive a fair market value for their electricity. This provision is limited to five percent of a utility's total generation, or two percent of a single type (fuel source) of generation.

Additionally, this bill directs the Federal Energy Regulatory Committee to set uniform reliability, safety, and interconnection standards in order to encourage mass development of affordable "plug-and-play" distributed energy units.

Federal Demand Reduction Standards

Senator Cantwell's bill calls for one percent per year reduction in peak (hourly) electricity demand by federal agencies beginning in calendar 2009, and continuing through 2018, for a total

demand reduction of ten percent relative to the base year of 2008. This provision can be waived for national defense and national security activities.

Regional and Smart Grid Plans

The bill requires states, unless specifically taking action to exempt them, to be broadly engaged in smart grid assessment and planning. This provision is considered essential to promote awareness at the state level, since state PUC's are the regulatory body which governs the electric utility business. The planning prescribed builds upon requirements in the Energy Policy Act of 2005 by specifically addressing:

- Inventories of existing grid infrastructure,
- Inventories of existing smart grid systems,
- Plans for monitoring grid infrastructure and determining the need for new infrastructure,
- Assessments of constraints to development of smart grid system and its components,
- Assessments of development and delivery of renewable energy resources,
- Assessments of reliability and restoration of reliability resulting from introduction of smart grid systems.

Technology Assessment and Research

The bill's final provision calls for substantial federal research in smart grid and associated information technology. This includes studies to better quantify performance and benefits from these systems, calculation of carbon efficiency benefits, establish the technical basis for a wide-area measurement exchange network, and special advanced computing systems which would allow real-time reliability control of large-scale grid systems.

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